

U.S. ENVIRONMENTAL PROTECTION AGENCY
POLLUTION/SITUATION REPORT
Rico Argentine Mine Site - Removal Polrep



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region VIII**

Subject: POLREP #2
Progress
Rico Argentine Mine Site
08BU
Rico, CO
Latitude: 37.6927729 Longitude: -108.0303502

To: David Ostrander, PAER

From: Steven Way, OSC

Date: 7/27/2012

Reporting Period: December 2011 to July 2012

1. Introduction

1.1 Background

Site Number:	08BU	Contract Number:	
D.O. Number:		Action Memo Date:	1/11/2011
Response Authority:	CERCLA	Response Type:	Time-Critical
Response Lead:	PRP	Incident Category:	Removal Action
NPL Status:	Non NPL	Operable Unit:	OU 1
Mobilization Date:		Start Date:	5/31/2011
Demob Date:		Completion Date:	
CERCLIS ID:		RCRIS ID:	
ERNS No.:		State Notification:	
FPN#:		Reimbursable Account #:	

1.1.1 Incident Category

CERCLA Time-Critical Removal Action

1.1.2 Site Description

1.1.2.1 Location

The Rico Argentine Mine Site is located north of the town of Rico, in Dolores County, Colorado, in portions of Sections 24 and 25, Township 40 North, and Range 11 West. The general Site location is shown in Figure 1. Rico is 45 miles due south of Telluride in southwestern Colorado. The Site is adjacent to the Dolores River and extends into Telescope Mountain and its related mine workings. The St. Louis Tunnel Adit and associated settling ponds are located on the eastern edge of Dolores County

approximately ½ mile north of the town of Rico. The settling ponds area is on the eastern bank of the Dolores River and occupies about 80 acres at an altitude of 8,800 feet. It is adjacent to the San Juan National Forest.

1.1.2.2 Description of Threat

The recent samples (June 2010) from the mine adit flow before entering the settling ponds showed total zinc concentrations at 8,300 ug/L (dissolved zinc was at 7,700 ug/L). The zinc concentration in the outfall to the Dolores River was 4,100 ug/L (dissolved zinc concentration was at 3,900 ug/L). Other heavy metals being released that may pose a threat include cadmium and copper. Significant releases of this mine water to the alluvial groundwater occur from the settling ponds at the Site. An estimated 68,000 cubic yards (cy) of lime precipitate sludge is contained in the settling ponds. Settling pond sludge contains heavy metals at percent levels (e.g. 4.4% zinc), and some of the ponds high water levels relative to the top of the dikes increase the potential threat that sludge and metals-laden water will overtop the ponds and flow into the Dolores River. For example, Pond 18 water level in June 2010 was within one foot of the top of embankment along the Dolores River. This is the same pond embankment that failed previously.

Sensitive ecosystem impacts are potentially occurring due to the ongoing releases to the Dolores River, which is considered a Cold Water Aquatic Life Class 1 by the state of Colorado. The metals concentrations being released into the environment exceed the low flow assimilative capacity of the river segment as determined by the State 2008 Water Quality Assessment (WQA).

1.1.3 Preliminary Removal Assessment/Removal Site Inspection Results

The area is bound to the west by the Dolores River and U.S. Forest Service land on the east. A portion of many of the ponds sit within U.S. Forest Service land boundaries. The remaining land is within several privately-held mining claims with different owners. In some cases, the ownership of specific parcels is uncertain. In 2000, an emergency removal was performed to address overtopping of one of the ponds. EPA's response consisted of raising and reinforcing the riverside embankment of the pond, adding an additional culvert between the pond and downgradient ponds, and installing overflow riprap as a backup drain path.

The St. Louis Tunnel Adit drains historical mine workings extending several thousand feet into Telescope Mountain and Dolores Mountain to the east and southeast, respectively. The St. Louis Tunnel is or was directly hydraulically connected to the mine workings of the former Pigeon, Logan, Wellington, Mountain Spring, Argentine, Blaine, and Blackhawk mines. The flows are reported to generally range from 2 to 3.3 cubic feet per second in the 2008 State WQA. The Blaine Mine Adit was discharging to Silver Creek as late as 2000. Flow was later diverted back into the workings of the Argentine Mine, which connects to the Argentine Shaft and through a drift to the St. Louis Tunnel. Based on an Atlantic Richfield 2000 sampling report, metals concentrations in the Blaine mine water included 7,000 ug/L cadmium, 5,200 ug/L copper, 844,000 ug/L iron, 505 ug/L lead, 149,000 ug/L manganese, and 230,000 ug/L zinc.

The adit discharge treatment historically consisted of a lime addition and precipitation of heavy metals into a series of 19 settling ponds at the Site. As of 1996, the estimated volume of lime-precipitation/metals sludge was in excess of 68,000 cy in 10 settling ponds. The settling ponds are unlined and surrounded by earthen dikes/berms. The construction material and geotechnical stability of the dike system is not known. The aerial extent of the system of settling ponds was reported to be within the 100-year floodplain of the Dolores River (Watershed Plan for the East Fork of the Dolores River in Dolores County, Grayling Environmental, August 17, 2006). A recent hydrology analysis (HEC-RAS model) performed for EPA of a limited segment of the river along the reach of the settling ponds indicates that the 100-year flood event would not be expected to overtop the pond system. However, the existing embankments will be impacted by 100-year event flood stage water to within approximately one foot of the top of the settling pond dike. This does not account for potential downstream channel constraints that may develop at the bridge that would likely cause back water levels to rise even higher.

The upper, largest pond, Pond 18, is estimated to contain the largest volume of impounded treatment sludge (approximately 24,000 cy wet). It is adjacent to the Dolores River and had little remaining freeboard at the dike along the river. In June 2010, for example, the sludge and water were measured to be less than 12 inches from the top of the dike embankment. During a second inspection in September 2010, beaver damming caused pond water to overtop the lower pond (Pond 5) banks and bypass the outfall structure. Pond 18 was drained by the PRP (ARCO) in October 2010.

2. Current Activities

2.1 Operations Section

2.1.1 Narrative

There are two general elements to the work required to meet the objectives for this Removal Action. The first involves removal of metals precipitate sludge from the settling ponds, and the second, water management of the discharge from the St. Louis Tunnel to control flow and/or reduce the metals concentration in the effluent to levels deemed protective of water quality and aquatic life in the Dolores River. Water management may take the form of active water treatment, reduction in flows or a combination thereof to meet effluent limits in the discharge to the river. The actions will be implemented in a phased approach to achieve the stated objective. The phased work will include: 1) actions with the settling ponds and associated sludge; and 2) conducting the necessary investigations and developing the engineering designs required to implement the actions associated with a water management system for adit discharge.

2.1.2 Response Actions to Date

- Site preparations for the 2012 construction season by ARCO began in late April 2012 including preparing roads and dust control on the precipitation solids, preparations for pumping the Blaine.

- Continuous (hourly) flow measurements are made at the St Louis Tunnel Adit (station DR-3) and the outfall (DR-6) to the Dolores River using automated instrumentation.
- Water samples are collected monthly from the St. Louis Tunnel discharge, two points within the pond system (discharge from Ponds 8 and 15), the outfall from the settling pond system to the Dolores River, and five locations in the Dolores River (below Silver Swan, above St. Louis settling pond system, above and below the St. Louis settling pond system outfall, and at USGS gauging station #09165000). The samples are analyzed for total and dissolved metals, alkalinity, hardness, total dissolved solids, total suspended solids, cyanide, salinity, and sulfate.
- Flood dike upgrades along settle ponds were made based on 100 year flood modeling (HEC-RAS). These included dike embankment filter material near seeps, riprap addition near the upper ponds (18 and 15) and dike elevation was raised along one section near Pond 9 to increase freeboard relative to flood stage water elevations. This was completed in June 2012.
- Geotechnical/geologic evaluation of potential solids repository sites in 2011 identified the steep slope of CHC Hill contains deep colluvial and landslide deposits. Most of the landslide deposit is a deep older deposit, but a smaller shallower portion of the landslide mass north of the existing soil/mine waste repository is currently active. This location was the preferred site prior to this finding. Additional sites will be evaluated in 2012.
- Pond 13 is will be used for the storage and drying of solids dredged from Pond 15 in August. The solids will be pumped to Pond 15 and water decanted and then re-circulated back to Pond 15. Pond 13 is not in the circuit of ponds currently receiving St. Louis Tunnel flow.
- Acid mine drainage source water investigations, using a tracer method, were performed by EPA in October 2011 to assess the Blaine adit flow and 517 Shaft connections to the St Louis Tunnel. The next phase of work in the Blaine was performed by EPA and its contractors with DRMS in a four day operation July 9 through 12, 2012 involving diverting flow and pumping the pooled mine water from the Blaine adit level to the 517 shaft via 6 inch piping on the surface. This work was performed jointly with ARCO's contractors to collect flow measurements and samples during the operations. Estimated base flow at the Blaine level ranged from 10 to 20 gpm at the time of pumping, which is substantially lower than other historical accounts of flow (e.g. 200 gpm) within the Blaine system. Flows may have been directed down the number 3 Shaft or other pathways connecting to the 517 Shaft during the early 1980's. In addition, the lower than expected flow may be a function of the exceptionally low snow pack in the 2011/2012 winter.
- Silver Creek tracer studies identified a loss of flow during the high-flow period, when flow was estimated to be between 29 cfs to 44 cfs, and during the low-flow period, when flow was estimated to be between 0.7 cfs and 2 cfs. Percent losses ranged from about 5.3 to 9 percent at high flow and 22 to 23 percent at low flow during dry conditions. It is uncertain if the flow loss from Silver Creek is contributing to the flow within the mine workings below the creek. This work was performed by EPA, USGS, DRMS and EPA contractors in June and October 2011. It was part of the Source Investigation work to determine potential sources of and control options for acid mine water in the workings.
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- A transducer was installed in the 517 Shaft in the fall of 2011 to measure water level changes at the water surface (approximately 455 feet below ground). However, icing conditions over the shaft caused the cable to break losing the transducer down the shaft.
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- Drying cell area geochemical analysis of the historical calcine tailings was performed to determine if drainage from the lime precipitation solids will contribute to leaching of hazardous constituents. However, results have not been provided due to concerns regarding the data from the lab procedures.
- St Louis Tunnel adit drilling was conducted in October/November to obtain geologic data and structural information on the collapse area to begin evaluating hydraulic control options. Bedrock is present in the St. Louis tunnel at approximately 300 feet upgradient of the existing portal structure. Additional drilling and geologic assessment is scheduled for August.
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- Underground mine workings investigations were performed by EPA and Colorado DRMS personnel to assess mine water chemistry, flow pathways, structural reliability of workings, and develop recommendations for rehabilitation needed to ensure access and continued transport of water to the St. Louis Tunnel. ARCO supported these efforts during the implementation of a tracer study in October and subsequent monitoring. The results indicated that a significant percentage of the metals load reporting to the St. Louis Tunnel originates in the Blaine/Argentine mine works.
- Samples of mine water from inside the Argentine Mine workings, which is upslope of the Blaine, contained extremely high metals concentrations. For example, zinc was measured at 2,460 milligrams per liter (mg/L). Addition investigation is being evaluated based mine maps and conditions underground.
- A coffer dam upgrade was constructed approximately 350 ft inside the Blaine Adit by the property owner to ensure that acid mine water did not discharge from the portal to Silver Creek and continues to flow to the Argentine Shaft. However, blockages exist in the workings between the coffer dam and the Argentine Shaft that impede flow.

2.1.3 Enforcement Activities, Identity of Potentially Responsible Parties (PRPs)

- A Unilateral Administrative Order (UAO) was issued to the Atlantic Richfield Company (ARCO) in May 2011 to implement the Removal Action specified in the Work Plan.

2.1.4 Progress Metrics

<i>Waste Stream</i>	<i>Medium</i>	<i>Quantity</i>	<i>Manifest #</i>	<i>Treatment</i>	<i>Disposal</i>
Heavy Metals Water Treatment Solids	precipitates	8000 cy	NA	NA	onsite

2.2 Planning Section

2.2.1 Anticipated Activities

2.2.1.1 Planned Response Activities

- o A drilling program is scheduled to begin in August to further investigate the St. Louis Tunnel geotechnical conditions to evaluate hydraulic control measures.
- o Work on pond 15 solids removal will begin in August 2012.
- o Mine workings rehabilitation work needed to ensure that acid mine drainage within the Blaine Adit continues flowing to the St. Louis Tunnel via the Humbolt drift to the 517 Shaft is scheduled to begin in August. This will include re-building the Blaine portal and replacing roof supports and lagging, removing the blockage beyond the coffer dam and stabilizing other overhead hazards within the mine. This work will be managed by the DRMS.
- o Insitu, temporary treatment is planned within the 517 Shaft to evaluate the load from the Blaine workings that has not yet been quantified relative to the contribution to the discharge at the St. Louis Tunnel adit.

2.2.1.2 Next Steps

- o Water treatment options reporting and pilot scale system plans are due to EPA from ARCO in August.
- o Develop plans for additional underground investigations focused within the Argentine Mine above the Blaine to determine if sources of concentrated mine drainage can be identified.
- o Continue work with historical mine maps to refine the site model computer mapping.

2.2.2 Issues

2.3 Logistics Section

No information available at this time.

2.4 Finance Section

No information available at this time.

2.5 Other Command Staff

No information available at this time.

3. Participating Entities

Colorado Division of Reclamation and Mining Safety has been funded by EPA to provide DRMS personnel to support the underground investigation and adit rehabilitation oversight.

4. Personnel On Site

EPA-START contractor has provided oversight and sampling teams throughout the project. During the June 2011 tracer investigation, the START team consisted of 4 person team. The October 2011 tracer investigation included a four person team from START and subcontractors (MSI).

DRMS provided approximately eight people over the course of 2 days of continuous sampling underground in the mine during the October 2011 tracer investigation.

USGS had a hydrologist onsite during both tracer events.

EPA personnel included the OSC and a regional hydrologist during both tracer events.

In June 2012, START had a three person team for three days setting up equipment underground for the Blaine Base Flow test. In July 2012, during the pumping event, START had a 5 person team (including a subcontractor).

EPA and DRMS were onsite during the July 9 through 12 Blaine Base Flow pumping event.

Anderson Engineering personnel, ARCO consultants, were onsite for Blaine Base Flow preparations and pumping.

5. Definition of Terms

No information available at this time.

6. Additional sources of information

No information available at this time.

7. Situational Reference Materials

No information available at this time.